

WHAT IS CLAIMED IS:

1. A programmable packet-based network having plural nodes for providing services to network subscribers, the network comprising:

5 a service creation tool having an operator interface for programming a service definition package, the service definition package having one or more packet processing behaviors defined in a network programming language;

10 a service control center interfaced with the packet-based network and operable to accept the service definition package for deployment to predetermined network nodes; and

15 at least one network node interfaced with the network, the node having a network processor, the node operable to perform the one or more packet processing behaviors translated from the network programming language.

2. The network of Claim 1 further comprising plural network nodes forming an internet service provider intranet, the packet processing behaviors establishing tunnels between the network nodes.

3. The network of Claim 1 wherein the service creation tool interface comprises a graphical user interface for defining services in the network programming language.

4. The network of Claim 1 further comprising a network processor abstraction layer associated with each network processor, the abstraction layer operable to translate the network programming language for execution
5 on the associated network processor.

5. The network of Claim 1 wherein the service control center comprises a software architecture for programming a network to provide a service, the
10 architecture having a service layer, an execution layer and an infrastructure layer.

6. The network of Claim 5 wherein the service comprises a rule-based service, the service layer
15 comprising service rules and the execution environment comprising an expert system.

7. The network of Claim 5 wherein the service layer comprises a dataflow program and the execution
20 layer comprises a dataflow processor.

8. The network of Claim 7 wherein the service further comprises an FPGA specification and the execution environment layer further comprise an FPGA compiler.
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9. The network of Claim 7 wherein the service further comprises a network processor pattern tree and the execution environment layer further comprises a network processor compiler.
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10. A method for programming nodes of a packet-based network, the method comprising:

defining a service in a programmable network language, the service having at least one packet
5 processing behavior;

compiling the service as a service definition package;

installing the service definition package on a service control center, the service control center
10 interfaced with the packet-based network;

instantiating the service as service objects deployed to one or more network nodes, the network nodes having one or more network processors operable to perform the packet processing behavior; and

15 translating the packet processing behavior from the service object for operation on the network processor.

11. The method of Claim 10 further comprising:

subscribing a network end user customer to the
20 service through the service control center.

12. The method of Claim 11 wherein subscribing further comprises:

25 providing customer parameters from the service control center to the network node, the customer parameters represented as instance variables of customer instances.

13. The method of Claim 10 wherein defining the service further comprises:

selecting rules for the service from a graphical user interface; and

5 translating the selected rules into the programmable network language.

14. The method of Claim 13 wherein selecting further comprises:

10 dragging parameter windows from a library window to a service definition window.

15. The method of Claim 14 wherein the library window comprises plural tabs associated with types of 15 packet processing behaviors, the tabs having parameter windows associated with parameters that define a packet processing behavior.

20 16. The method of Claim 15 wherein the tabs comprise a shape tab, a classify tab, a modify tab and a queue tab.

25 17. The method of Claim 10 wherein the packet processing behavior establishes a tunnel between a first and second network node.

18. The method of Claim 10 wherein defining the service further comprises defining a service layer, an execution layer and an infrastructure layer.

19. A software architecture for providing a service on a packet-based network comprising:

a service layer having instructions that identify packet processing behaviors for execution by
5 predetermined execution elements of a network node;

an execution environment layer interfaced with the service layer, the execution environment layer representing the network node execution elements to execute instructions from the service layer; and

10 an infrastructure layer interfaced with the execution environment layer, the infrastructure layer providing management functions to support the network node execution elements.

15 20. The architecture of Claim 19 wherein the service layer comprises a set of rules and the execution environment layer comprises an expert system.

21. The architecture of Claim 19 wherein the
20 service comprises a dataflow program and the execution environment layer comprises a dataflow processor.

22. The architecture of Claim 21 wherein the service comprises one or more packet processing behaviors
25 specified by the dataflow program, the service further comprising an FPGA specification, and the execution environment layer further comprising an FPGA compiler.

23. The architecture of Claim 21 wherein the service comprises one or more packet processing behaviors specified by the dataflow program, the service further comprising a pattern tree for a network processor, and
5 the execution environment layer further comprising a network processor compiler.

24. The architecture of Claim 19 having a reporting element, the execution environment further comprising a
10 procedural abstraction of the reporting element.

25. A graphical user interface for programming network nodes of a packet-based network, the graphical user interface comprising:

5 a library window having plural tabs, each tab having one or more functions represented by windows adapted to identify one or more parameters associated with the functions; and

10 a service window presented proximate to the library window, the service window adapted to present functions as elements of a service;

wherein the functions of the library window are further adapted for insertion in the service window to define a service.

15 26. The graphical user interface of Claim 25 wherein the library window tabs comprise a queue tab having a queue function window.

20 27. The graphical user interface of Claim 26 wherein the queue function window defines a queuing function for packets associated with a service as a parameter input into the queue function window.

25 28. The graphical user interface of Claim 27 wherein the queue function parameter comprises queuing on a best effort basis.

30 29. The graphical user interface of Claim 27 wherein the queue function parameter comprises queuing packets to have priority transmission across the network.

30. The graphical user interface of Claim 26
wherein the queue function window discards packets.

31. The graphical user interface of Claim 25
5 wherein the library window tabs comprise a classify tab
having an IP address function window.

32. The graphical user interface of Claim 25
wherein the library window tabs comprise a modify tab
10 having a function window that defines a packet modifying
behavior.

32. The graphical user interface of Claim 25
wherein the library window tabs comprise a shape tab
15 having a function window that defines a packet shaping
behavior.